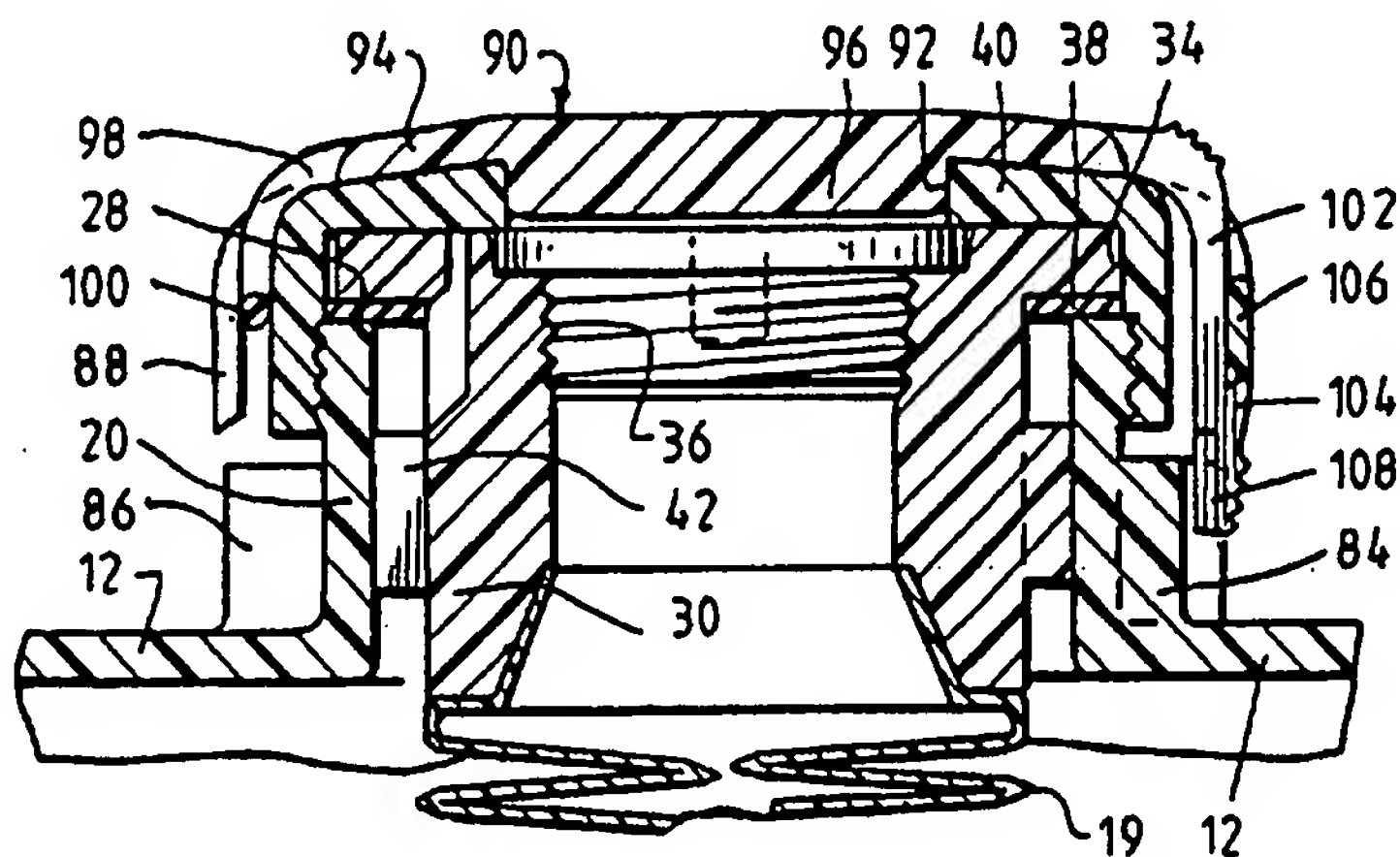




## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>5</sup> :  B65D 77/06, 25/16	A1	(11) International Publication Number: <b>WO 94/19255</b>  (43) International Publication Date: 1 September 1994 (01.09.94)
<p>(21) International Application Number: PCT/AU94/00068</p> <p>(22) International Filing Date: 16 February 1994 (16.02.94)</p> <p>(30) Priority Data:            PL 7329 16 February 1993 (16.02.93) AU            PL 8527 28 April 1993 (28.04.93) AU</p> <p>(71) Applicant (for all designated States except US): ANATOL NOMINEES PTY. LTD. [AU/AU]; (ACN 005 903 033), 50 Heads Road, Donvale, VIC 3111 (AU).</p> <p>(72) Inventor; and            (75) Inventor/Applicant (for US only): TKATCHENKO, Tolik [AU/AU]; 50 Heads Road, Donvale, VIC 3111 (AU).</p> <p>(74) Agent: MACAULEY, Colin, Douglas; Callinan Lawrie, 278 High Street, Kew, VIC 3101 (AU).</p>	<p>(81) Designated States: AU, BB, BG, BR, BY, CA, CN, CZ, FI, GE, HU, JP, KG, KP, KR, KZ, LK, LV, MD, MG, MN, MW, NO, NZ, PL, RO, RU, SD, SK, TJ, UA, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p><b>Published</b>  <i>With international search report.</i></p>	

(54) Title: CONTAINER SYSTEM AND BAG ASSEMBLY



## (57) Abstract

The invention discloses a bag assembly (18) for insertion into a cylindrical container with a top portion (12). The bag assembly (18) has an outwardly flanged support fitting (30) secured to the mouth of a plastic liner (19). The bag assembly is folded pleatwise to provide a folded bag unit (66) which can be inserted into a dispensing opening (24) in the top portion of the container. The folded pleatwise bag assembly is retained by a retention means which will break on filling the bag assembly. The flanged support fitting (30) further comprises an air outflow passage (48), one or more external lugs (42), and an internal thread to receive a bung. The support fitting is secured to the container wall forming the dispensing opening by a cap (40) which may have a hinged closure member (90).

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## CONTAINER SYSTEM AND BAG ASSEMBLY

The present invention relates to a container system and more particularly, though not of course exclusively, to a container system including a container for use in transporting or holding liquids, gaseous, granular or pulverulent material and is especially  
5 suitable for chemicals and other dangerous substances. This invention also provides a method of filling such a container and a bag assembly for such containers.

Chemicals and other dangerous substances are typically  
10 transported from the supplier to the user in large drums of metal or a suitable rigid plastics. Although it is possible for the drum to be reused, this will usually involve a cleaning operation by the supplier before the drum can be filled with fresh product. Depending on the nature of the contents, cleaning may be a hazardous operation and  
15 may not be economically feasible and/or may pose serious health risks. In the circumstances the drum may need to be dumped at a chemical waste disposal site after only a single use.

It is known to provide drums and other transport containers with a plastics liner. For example, international patent  
20 publication WO89/00428 discloses a transport tank with an individual external supporting frame. The tank may be fitted with a removable lining bag, which may be shaped so that it can be easily inserted or removed through an access port in the top of the tank. The reference illustrates a close engagement of the bag opening with an  
25 upstanding peripherally flanged neck at the tank access opening. The inserted bag is said to be expanded into position as a lining by application of a vacuum through a pipe opening to the space between the bag and the tank wall.

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The arrangement disclosed in publication WO89/11428 entails only a loose bag and no indication is given as to how the bag is, in practice, sealed and fitted to the tank access opening. Indeed, there is nothing to prevent the bag being lost into the interior of the tank. Furthermore, no detail is offered in relation to the shape or folding of the bag.

US patent 4635814 does address these problems by proposing a liner bag with a pair of glands which are snap fitted into respective access ports in a drum lid and which provide respective openings for pouring in liquid and for permitting air to escape from the bag as it is filled. The glands carry sealing O-rings and internal threads to receive closure plugs. In this case, the bag is expanded by admission of compressed air; air between the bag and the drum wall escapes via a venting opening in the drum lid which is then closed with a sealing plug. On discharge of the bag contents, the liner is retained in substantially intimate contact with the drum wall.

In the arrangement of US patent 4635814, the bag can only be fitted to the access opening from under the lid, which may not be easily removed and may indeed be semi-permanent. The system does not therefore maintain a general facility for removal and replacement of the bag through the drum or tank access port. The fact that this is not intended is highlighted by the provision to retain the lining against the drum wall during discharge of the drum contents.

A further limitation with the arrangement of patent 4635814 is that the bag cannot be readily fitted to an existing drum or container with an integral or otherwise sealed top, since the arrangement requires removal of the top to gain access to the underside of the access opening for attaching the gland.

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US patent 3163544 discloses a flexible expandable bag for food or like use with a rim having a hinged closure lid for closing the rim. This structure can be used either alone or as an insert suspended from the rim of a jar or other open topped container.

5 This reference is clearly not concerned with the storage or transport of dangerous substances, or with the provision of a bag which can be inserted and removed through the access opening of a drum or container with an integral or otherwise sealed top.

It is an object of the invention, at least in one of its aspects,

10 to provide an improved container system for use in the transportation and storage of a chemical or other dangerous substance.

According to a first aspect of the invention there is provided a bag assembly for insertion into a substantially rigid outer container including one or more side walls and a top which is

15 integral with or sealingly attached to the side walls, and which has an opening for filling and emptying said container, said bag assembly including a bag of a flexible material which is impervious to a substance to be stored therein, said bag having a mouth connected

20 to an outwardly flanged support fitting defining a port for filling and emptying said bag, said outwardly flanged support fitting adapted to co-operate with said opening of said container to act as a closure for said container and said bag being insertable into the container in collapsed form through said opening and being withdrawable from

25 said container in collapsed form through the opening.

Preferably said bag is folded to form a fully folded bag unit having the flanged support fitting at one end of the unit, said unit being insertable through said opening so that said bag unit then depends from said outwardly flanged support fitting when said

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outwardly flanged support fitting co-operates with said opening. In a preferred embodiment a retention means is provided to retain said bag as said fully folded bag unit. The retention means preferably includes a weakness which is breakable by the application of gas to said bag through said port to thereby allow the bag to expand and unfold.

In a particularly preferred embodiment the flange of said support fitting is adapted to locate on an annular seat provided by a cylindrical extension about said opening of said container. The support fitting may include means to define an air outflow passage between said support fitting and said cylindrical extension for egress of air from between said bag and said container when the bag is expanded within the container by admission of compressed gas to the bag through said port.

The invention also extends to a method of filling a substantially rigid container including one or more side walls and a top which is integral with or sealingly attached to the side wall(s) and which has an opening for filling and emptying the container, comprising inserting a said bag unit through said opening, applying compressed gas through said port to expand said bag within the container while venting the space between the bag and the container, and thereafter admitting a substance to the expanded bag through said port.

Embodiments of the invention will now be described by way of non-limitative example only with reference to the accompanying drawings in which:

Figure 1 is a vertical cross-section through a drum and bag assembly of a container system in accordance with a first embodiment of the invention;

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Figure 2 is an exploded partial cross-sectional drawing showing in detail a support fitting and associated mounting structure of the drum and bag;

5 Figure 3 is a similar view to that of Figure 2 showing the assembled bag unit and cap secured to the drum in full cross-section;

Figure 4 is a cross-sectional view along and in the direction of arrows 4-4 shown in Figure 3;

Figure 5 is a similar view to that of Figure 2 of a second embodiment of the invention;

10 Figure 6 is a cross-sectional view along and in the direction of arrows 6-6 shown in Figure 5;

Figure 7 is a cross-sectional view along and in the direction of arrows 7-7 shown in Figure 5;

15 Figure 8 is a cross-sectional view along and in the direction of arrows 8-8 shown in Figure 5;

Figure 9 is a cross-sectional view of the assembled bag unit and cap secured to the drum shown in Figure 5;

20 Figure 10 is a perspective view with partial cross-section of a thread converter which may be used in conjunction with the invention;

Figure 11 is a cross-sectional view of the assembly of the thread converter system in Figure 10 with the bag unit shown in Figure 2;

25 Figure 12 depicts a suitable form of bag assembly for insertion into the container;

Figures 13 to 16 illustrate a first embodiment of the successive stages of folding and assembling the bag for insertion into the container;

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Figures 17 to 21 illustrate a second embodiment of folding the bag for insertion into the container;

Figure 22 is a side view of the folded bag shown in Figure 18;

5           Figure 23 is a similar view to that of Figure 22 showing a variation in folding of the bag; and

Figure 24 shows the folded bag of Figure 21 with a retention means secured thereto.

10           In the various embodiments illustrated similar integers are referenced with the same numerals to avoid unnecessary repetition of description.

15           The container system depicted in Figures 1 to 4 comprises a rigid outer container 10 of metal or a suitable rigid plastics. The particular outer container shown is in the form of a cylindrical drum with a capacity of 205 litres, this being a typical container as currently used for the supply of chemical products. It is however to be understood that the invention is not restricted in its broad concepts to an outer container of that capacity or an outer container of that shape. The drum has a top or lid 12, a cylindrical body 14 forming a closed side wall, and a base 16. The top, body and base may be moulded as an integral unit, or alternatively the top 12 and/or the base 16 may be separately formed but sealingly attached to the body 14. The fitting between the top 12 and the body 14 can be such as to allow occasional detachment and reattachment of the top 12 to the body 14, but will normally be sealingly or integrally attached about its periphery because of the possible hazardous nature of the substance to be carried by the drum. The drum carries a removable bag assembly 18 having a liner 19 which collapses during emptying of the contents and is then removed and replaced with

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new bag assembly 98 to permit refilling with fresh contents. The bag assembly 18 is attached to the top 12 of the drum by an attachment system which will now be described.

5 The attachment system (best seen in Figure 2) comprises a cylindrical section 20 secured around a hole 22 within the top 12 of the drum and defining a filling and emptying or dispensing opening 24 into and from the interior of the drum. Cylindrical section 20 has an external thread 26 and its rim acts as a seat 28 for an outwardly flanged support fitting 30 at the top of or fixed to the liner 19. The  
10 cylindrical section 20 is constructed of metal or a suitable rigid plastics material and is fixed to the top 12 of the drum by welding or being integrally formed, e.g. moulding, with top 12.

The fitting 30 at the top of the liner 19 is in the form of a collar comprising a depending sleeve 32 of a size such that it can  
15 extend through the opening 24. At its upper end, sleeve 32 has an outwardly-directed annular flange 34 which rests upon seat 28 of the cylindrical section 20. Support fitting 30 is internally threaded at 36 to receive a bung (not shown). A gasket or seal 38 underlies flange 34 to prevent leakage from the drum if liner 19 happens to break.  
20 An internally threaded cap 40 engages external thread 26 on cylindrical section 20 about rim 28. The interior diameter of cap 40 is greater than the internal diameter of the support fitting 30 whereby a threaded fitting of a dispensing tap or a threaded pump inlet fitting can be screwed directly into the support fitting 30 after  
25 removal of the bung (not shown).

Fitting 30 has four peripherally spaced external lugs 42 which engage the inner surface of cylindrical section 20 and thereby define an annular air flow passage 44 between the body of fitting 30 and cylindrical section 20. The number of lugs 42 can be varied to

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suit requirements. Lugs 42 also serve as a guidance means for insertion into opening 24. If cap 40 is loosened off, flange 34 and its gasket 38 can lift off rim 28 to release air from between the drum and the bag as the bag is expanded by compressed air admitted through the interior of fitting 30. Air flow passage 44 therefore obviates any need for a separate venting port in the drum.

The liner 19 is in the form of a flexible plastics film which will not be degraded by the contents of the container. The liner 19 may consist of polyethylene or other suitable plastics and may be in the form of a single layer, or of a laminate of two or more layers, e.g. a barrier film, depending on requirements. The mouth of the liner 19 is permanently attached to the fitting 30, preferably by welding, for which purpose the fitting 30 is itself formed from a suitable plastics, although other forms of attachment such as a suitable adhesive or detachable connection could be used. As shown, the mouth of the liner 19 is attached to the face of an internal taper 46 of fitting 30 to ensure optimum sealed contact. The liner could also be readily secured to the outer surface of sleeve 32.

Fitting 30 may also have an air inlet port 48 fitted with a one-way valve (not shown) to admit air to passage 44, and hence to the space between the drum and the bag, during emptying of the bag's contents. This air inlet port includes the one-way valve to guard against leakage of dangerous substance from the drum in the event that the bag bursts. The one-way valved port 48 may have an optional extension tube (not shown) fitted underneath to extend in the drum to the diametrically opposed point from the fitting 30. This tube would allow air to enter the space between the bag liner and the drum during emptying in the event of a non-vented drum being used.

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To assist in correct orientation of the support fitting an alignment means may be used. In one practical embodiment depending sleeve 32 has a notch 50 which co-operates with a step 52 located inside cylindrical section 20 to ensure the correct angular orientation of support fitting 30, and hence correct positioning of liner 19.

The liner 19 is introduced into the drum in concertinaed or other folded form, to be described in greater detail below, through the opening 24. The final stage of insertion of the liner 19 involves the seating of the flange 34 of the fitting 30 against seat 28 of the cylindrical section 20 and the securement and sealing of the fitting 30 to the cylindrical section 20 by the insertion and tightening of the cap 40. The liner 19 is then expanded to substantially conform to the interior shape of the drum either by blowing compressed air into the liner 19 through the open centre of cap 40 or by evacuating the interior of the drum externally of the liner 19. The second option is not preferred as it will require the top 12 of the drum to include a threaded vent plug (not shown) which can be removed either to permit escape of air from the interior of the drum as the liner 19 is expanded or to form a port through which vacuum can be applied in order to expand the liner 19. Many old drums include this additional threaded vent plug. The liner 19 is then filled with the required contents and the container is closed by screwing the bung into the interior thread 36 of support fitting 30. The sealed container can then be transported to the user.

At the site of use, the contents are removed either through a tap screwed into the interior thread 36 of the support fitting or through an inlet fitting for a pump screwed into the interior thread 36. As the container is progressively emptied, the liner 19 collapses

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in order to minimise dead spaces within the interior of the liner 19 and for this purpose it is important to note that the initial expansion of the liner prior to filling does not result in the permanent conformation of the liner 19 to the interior shape of the drum under the pressure differential applied across the liner. As the contents are progressively emptied, the liner collapses to leave almost no dead space within the liner 19 after substantially complete emptying. Such collapse is facilitated by providing air inlet port 48 in the support fitting to admit air to the space between the liner and the drum. At this state the drum is closed by removal of the tap or pump inlet fitting and insertion of the bung into the interior thread 36 of the support fitting and the drum (if required) together with the collapsed liner therein is returned to the supplier. At the supplier, the collapsed liner 19 is removed by unscrewing the cap 40 from the support fitting 30 and withdrawing the collapsed liner 19 through the holes 22, 24 for subsequent disposal. As the liner 19 has collapsed the operator will not be subject to contamination by an small amounts of residual chemicals remaining within the liner 19, and the small volume of the collapsed liner 19 will facilitate the disposal operation.

At the supplier, a fresh bag assembly 18 is inserted into, and expanded within, the drum in the manner described above to enable the drum to be refilled with fresh product. As the interior of the drum has not been in direct contact with the previous filling, no washing or cleaning of the interior of the drum is necessary.

To facilitate draining of the contents, the drum inlet/outlet (as defined by the cylindrical section 20) is located adjacent to an edge of the drum. This requires the support fitting 30 to be attached asymmetrically to the body of the liner, so that the liner 19 can

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expand outwardly from the fitting to conform to the interior shape of the drum. Due to this asymmetric mounting of the support fitting 30 to the bag which forms the liner, it is necessary that the fitting is inserted into the ring 10 in the correct angular orientation to enable the full expansion of the liner 19. This can be achieved by providing co-operating locating means such as a step 52 and notch 50.

Figures 12 to 16 depict a suitable liner bag 19, and the successive stages of folding the bag for insertion into the drum. The flat bag is generally rectangular with two large panels 54, 56, and has the support fitting 30 at the transverse centre of one panel but quite close to one end 58. The bag is successively folded in from ends 58, 60, by back and forth zig-zag pleating, to a fold line 62 intersecting support fitting 30, to form an intermediate assembly 64 (Figure 14) of overlaid elongate pleats extending in concertinaed or zig-zag fashion from ends 58, 60 to fold line 62. This intermediate assembly 64 is then folded onto itself (Figure 15) to form a fully folded bag unit 66 in which fitting 30 is at one end of the unit. This unit 66 is insertable through hole 22 into the drum so that the bag unit then depends from the support fitting when the latter engages seat 28 and is reliably expandable by compressed gas to form a lining for the drum.

Alternatively, with reference to Figures 17 to 23, the flat rectangular bag may be successively folded in from sides 68, 70 by back and forth zig-zag pleating to a fold line 72, either before or after folding (23) the bag in half. In the latter case, the side edges 68, 70 coincide and the doubled over bag is folded in zig-zag fashion to the fold line 72, as indicated in Figure 22. The former case is illustrated in Figure 23. It may then be folded under itself (Figure 20) from

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both ends of the resultant elongate intermediate assembly to form the bag unit 66', again having the fitting 30 at one end.

5 It has been found that the use of a zig-zag pleating, as distinct for example from continuous roll-over folding, produces a bag which expands out quickly and evenly on application of compressed air. Other folding patterns reduce the effectiveness of expansion and/or risk bursting of the bag.

10 Bag units 66, 66' can be held fast for storage, transport or sale by a suitable ligature, e.g. an elastic band or tie strip, or by other retaining means such as an enclosing sleeve of a light plastics material. If a sleeve is employed for this purpose, as for example at 76 in Figure 16, the sleeve typically has a longitudinal zone of weakness, e.g. a line of perforations 78, so that the sleeve will break and open under a given pressure of compressed air in the bag, 15 thereby allowing the bag to freely expand. The line of perforations 78 may have a lead-in V-cut 80 at the top of the sleeve, to further facilitate its frangible nature and to provide an opening for initial expansion of the bag. The sleeve is preferably attached at its top rim to the fitting 30, e.g. by a local weld, so that the sleeve too is 20 withdrawn with the bag when the latter is pulled out through hole 22. In this arrangement, the sleeve would typically lie pressed between the expanded bag and top 12.

25 If a tie 74 or other ligature is employed, in conjunction with or separate from sleeve 76, the tie typically also has a weakness which is frangible at the predetermined air pressure, and a local weld 82 to secure it to the bag or can be removed prior to insertion of liner 19.

Figures 5 to 9 illustrate a variation of the embodiment shown in Figures 1 to 4. Cylindrical section 20 has a ratchet 84

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integrally formed thereabout to assist in locking cap 40 to container 10. Ratchet 84 has a plurality of angled teeth 86 encircling cylindrical section 20.

5 A closure member 90 co-operates with cap 40 to provide a seal for aperture 92. Closure member 90 has a disc-shaped main body 94 with a depending seal member 96 which sealingly engages with aperture 92. Closure member 90 may be integrally formed with cap 40 or fitted thereto in any convenient manner. In the illustrated embodiment closure member 90 has an angled arm 98 with a pair of  
10 stub axles 100 on either side thereof. Stub axles 100 engage with a pair of hooks 88 on cap 40 to provide a hinging action. Opposite angled arm 98 is a depending tab 102 having a barb 104 on the outer face thereof. Barb 104 co-operates with a latch 106 on cap 40 to prevent disengagement of closure member 90 from cap 40. Tab 102  
15 also includes a tooth or pawl 108 which engages teeth 86 of ratchet 84.

During filling of container 10 cap 40 and closure member 90 are not installed on cylindrical section 20. Once filled closure member 90 is sealingly engaged with cap 40 by pushing barb 104 into  
20 the latching position with latch 106. Cap 40 is screwed onto thread 26. Tooth or pawl 108 will eventually contact ratchet 84 and sequentially flex over respective teeth 86. When cap 40 is in the position shown in Figure 9 it will not be possible to rotate cap 40 in the counter direction as tooth or pawl 108 will interfere with ratchet  
25 84. A suitable tamper proof device (not shown) could be affixed to, or integral with, cap 40 to indicate an unauthorised attempt to lift closure member 90. When it is required to obtain access to the contents of container 10 barb 104 can be pushed inwardly to clear latch 106 and tab 102 pushed upwardly through latch 106. Such

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action will break the tamper proof seal, if fitted, and disengage tooth or pawl 108 from ratchet 84. Hinging open closure member 90 will allow access to the contents of container 10.

5           Figures 10 and 11 illustrate the use of a thread converter 110 where cylindrical section 20 has an internal thread 112 instead of the external thread 26. Thread converter 110 allows the support fitting 30 shown in Figures 2 to 4 to be used. Thread converter 110 includes a cylindrical inner sleeve 116 and a circumferential flange 114. Depending from flange 114 is an outer cylindrical sleeve 118  
10           which is co-axial with sleeve 116. Sleeve 118 is substantially shorter than sleeve 116 and has an external thread 120 thereon for co-operation with internally threaded cap 40. To secure thread converter 110 to cylindrical section 20 an external thread 122 is provided on inner sleeve 116.

15           In order to prevent easy removal of thread converter 110 when fitted on cylindrical section 12, a plurality of barbs or protrusions 124 are provided which, in use, will snap lock under top 12. Slots 126 will provide a flexibility to assist the snap lock action and to allow air egress, on inflation of liner 19. An annular ring 128  
20           will ensure barbs 124 cannot be retracted whilst support fitting 30 is inserted. This is important in order to prevent bursting of thread converter 110 from container 10 in a drum "drop" situation.

          The embodiments have been described by way of example only and modifications are possible within the scope of the  
25           invention.

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## CLAIMS

1. A bag assembly for insertion into a substantially rigid outer container including one or more side walls and a top which is integral with or sealingly attached to the side walls, and which has an opening for filling and emptying said container, said bag assembly including a bag of a flexible material which is impervious to a substance to be stored therein, said bag having a mouth connected to an outwardly flanged support fitting defining a port for filling and emptying said bag, said outwardly flanged support fitting adapted to co-operate with said opening of said container to act as a closure for said container and said bag being insertable into the container in collapsed form through said opening and being withdrawable from said container in collapsed form through the opening.
2. The bag assembly of claim 1, wherein said bag is folded to form a fully folded bag unit having the flanged support fitting at one end of the unit, said unit being insertable through said opening so that said bag unit then depends from said outwardly flanged support fitting when said outwardly flanged support fitting co-operates with said opening.
3. The bag assembly of claim 1, wherein said bag is generally rectangular and is folded or is pleated, creased or otherwise adapted to be folded, so as to define an intermediate assembly having a plurality of overlaid elongate pleats extending zig-zag fashion from opposite ends or sides of the bag to a fold line intersecting said outwardly flanged support fitting, the intermediate assembly being adapted to be folded on itself to form a fully folded bag unit having the flanged support fitting at one end of the unit, said unit being insertable through said opening so that said bag unit then depends

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from said outwardly flanged support fitting when said outwardly flanged support fitting co-operates with said opening.

4. The bag assembly of claim 2 or 3, further including a retention means to retain said bag as said fully folded bag unit.

5 5. The bag assembly of claim 4, wherein said retention means includes a weakness which is breakable by the application of gas to said bag through said port to thereby allow the bag to expand and unfold.

6. The bag assembly of claim 4, wherein said retention means  
10 is a sleeve, tie or other ligature which surrounds at least part of said fully folded bag unit, said sleeve, tie or other ligature having a zone of weakness so that said sleeve, tie or other ligature will break on application of gas to said bag through said port to thereby allow the bag to expand and unfold.

15 7. The bag assembly of any one of claims 4, 5 or 6, wherein a part of said retention means is secured to said bag or said outwardly flanged support fitting to prevent detachment therefrom.

8. The bag assembly of claim 1, wherein the flange of said support fitting is adapted to locate on an annular seat provided by  
20 a cylindrical extension about said opening of said container.

9. The bag assembly of claim 8, wherein said support fitting includes means to define an air outflow passage between said support fitting and said cylindrical extension for egress of air from between said bag and said container when the bag is expanded  
25 within the container by admission of compressed gas to the bag through said port.

10. The bag assembly of claim 8, wherein said support fitting includes at least one external lug which engages the inner surface of said cylindrical extension and defines an annular air flow passage

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between support fitting and said cylindrical extension for egress of air from between said bag and said container when the bag is expanded within the container by admission of compressed gas to the bag through said port.

5        11.        The bag assembly of claim 10, wherein a plurality of external lugs are provided and a second port is provided in said support fitting opening into said annular air flow passage.

12.        The bag assembly of claim 11, further including a one-way valve in said second port.

10        13.        The bag assembly of any one of the preceding claims, wherein said flanged support fitting is threaded internally about said port to receive a closure for sealing said port against egress of air, gas or substance within said bag and/or receiving a detachable conduit, tap or pump for emptying or filling said bag.

15        14.        The bag assembly of claim 1, wherein said mouth of said bag is secured to an internal taper of said fitting.

15.        A container system including a bag assembly of claim 8 and said substantially rigid outer container, wherein said internal thread of said cylindrical extension of said container is externally threaded to receive a threaded cap which sealingly clamps said flanged support fitting to said cylindrical extension.

20        16.        The container system of claim 15, wherein said support fitting includes a notch for co-operating with a step on said cylindrical extension to ensure correct alignment of said bag assembly with said container.

25        17.        The container system of claim 15 or 16, wherein said threaded cap includes an aperture and said aperture is closed by a hinged sealing means.

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18. The container system of claim 17, wherein said hinged sealing means includes a releasable latch allowing said aperture to be exposed, said releasable latch depending from said cap to engage ratchet means externally mounted to said cylindrical extension.

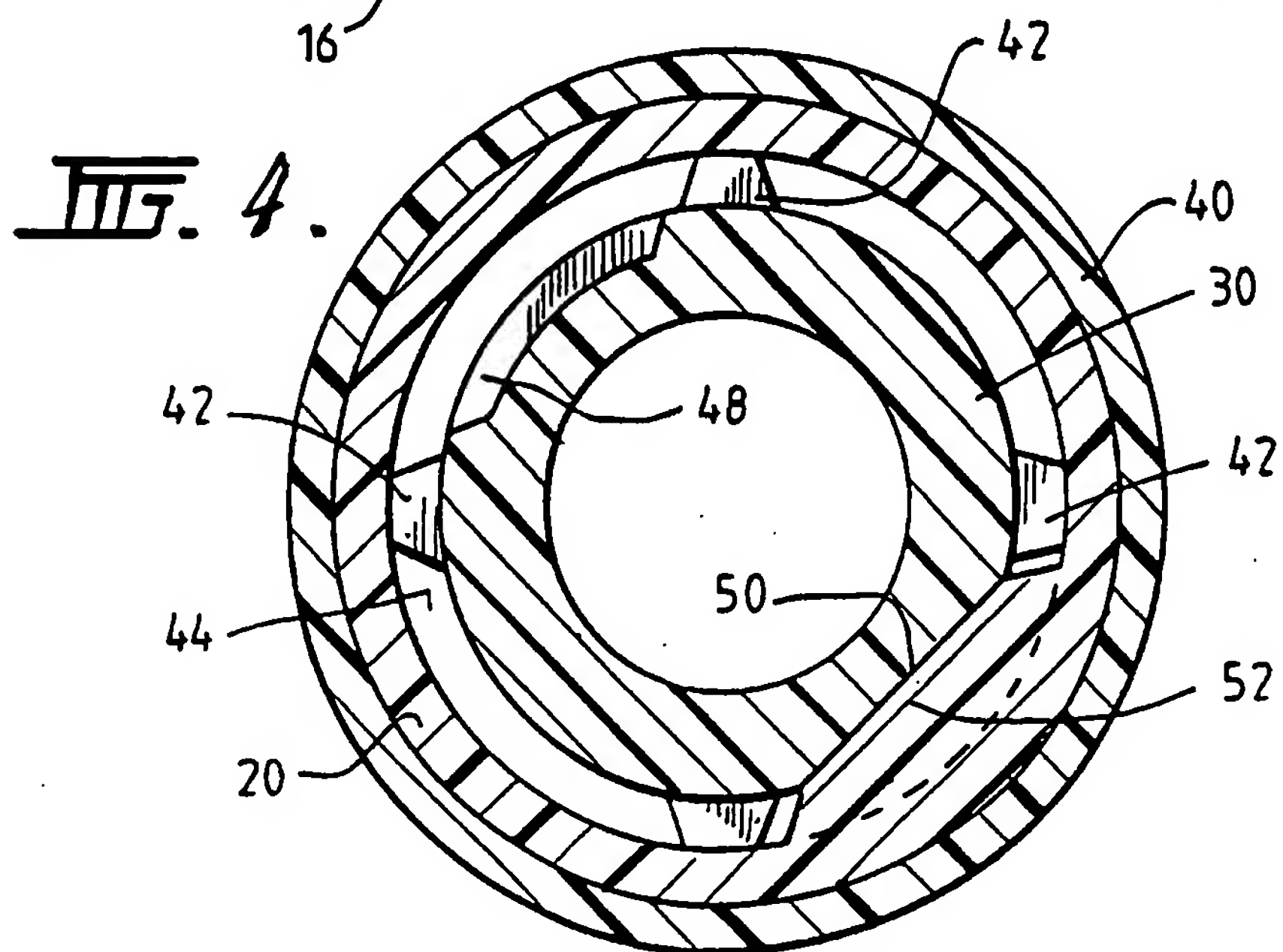
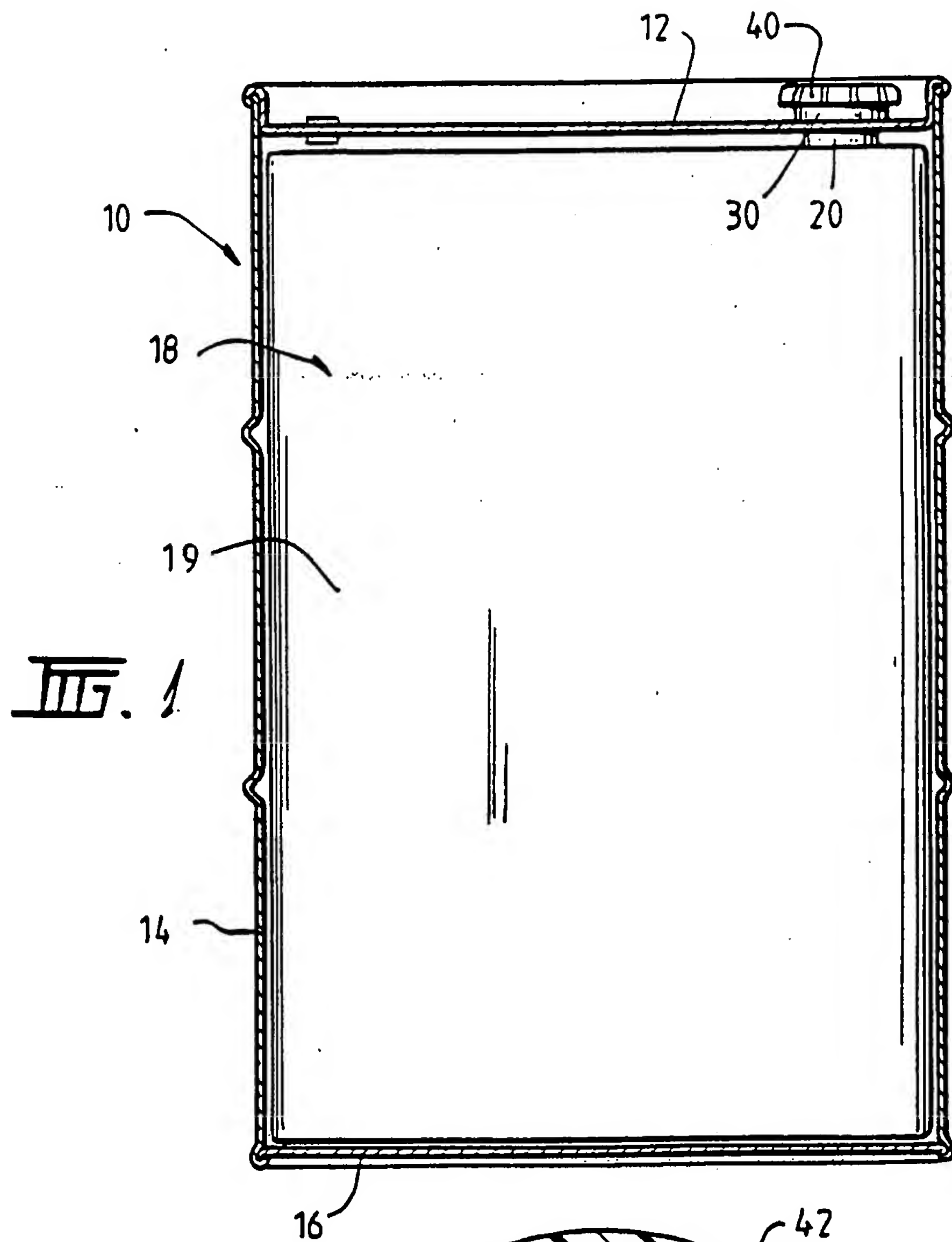
5 19. The container system of any one of claims 14 to 17, further including a seal located between the flange of said support fitting and said threaded cap.

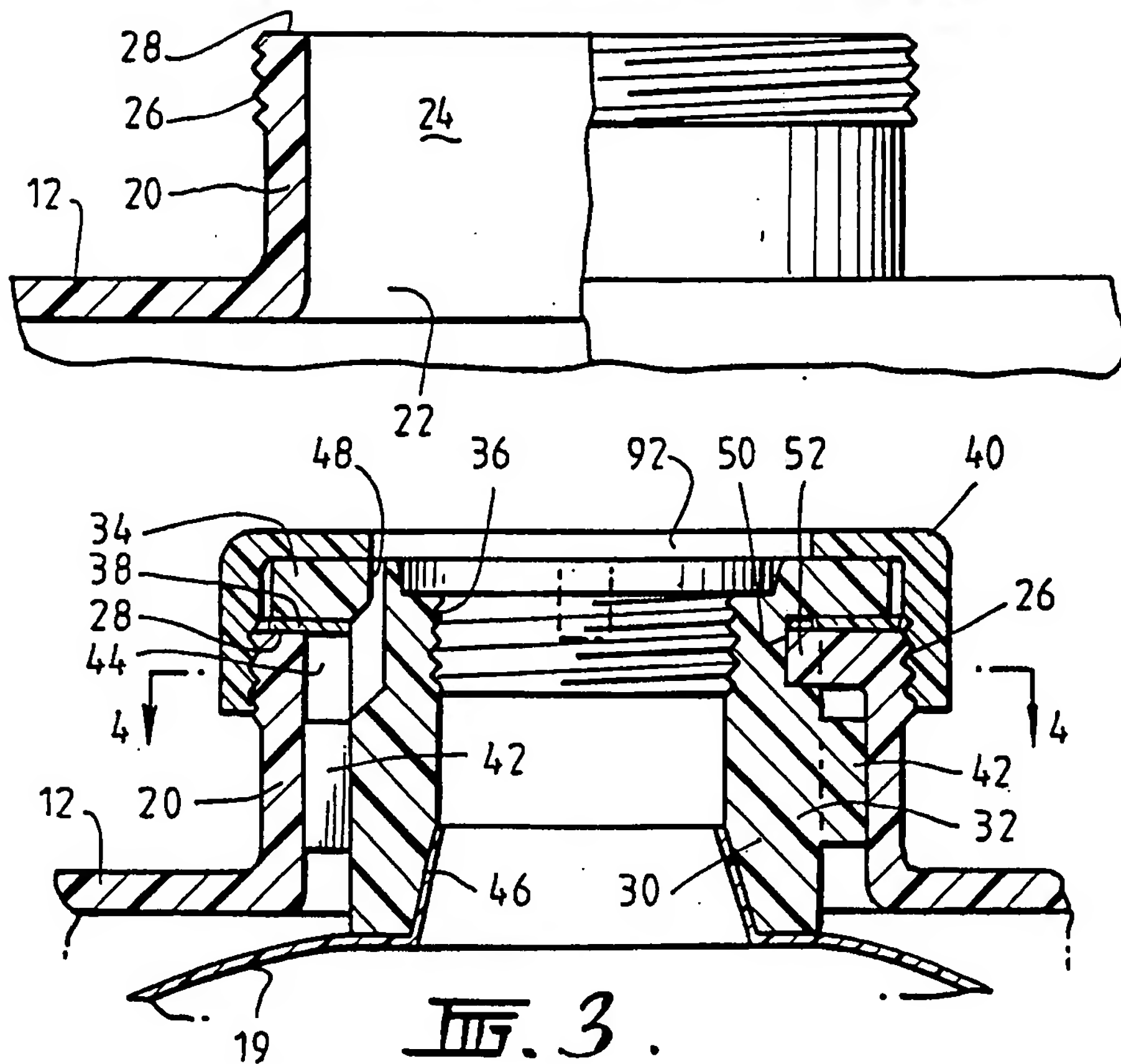
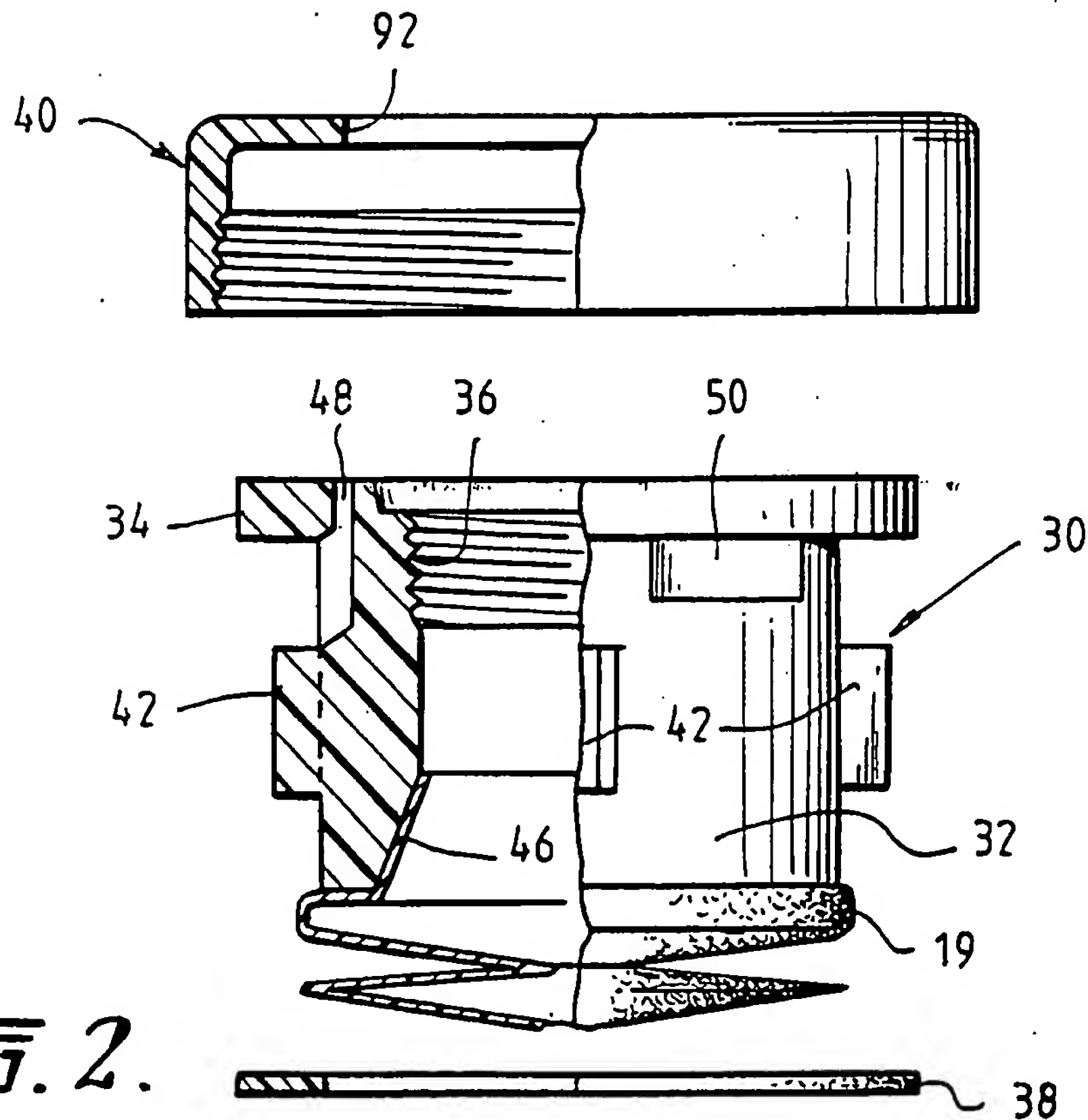
20. A thread converter for providing an external thread to an internally threaded cylindrical mouth, said thread converter including  
10 a cylindrical inner sleeve for insertion into said cylindrical mouth, an annular sleeve co-axial with said cylindrical inner sleeve and depending from a circumferential flange at one end of said cylindrical inner sleeve, a first thread on the outer surface of said cylindrical inner sleeve under said annular sleeve for co-operating with said  
15 internally threaded cylindrical mouth and a second thread on the outer surface of said annular sleeve.

21. The thread converter of claim 20, wherein said cylindrical inner sleeve has a plurality of slots at the other end of said cylindrical inner sleeve.

20 22. The thread converter of claims 20 or 21, wherein protrusions are provided at said other end of said cylindrical inner sleeve to provide a snap lock action with said cylindrical mouth.

23. A method of filling a substantially rigid container including one or more side walls and a top which is integral with or sealingly  
25 attached to the side wall(s) and which has an opening for filling and emptying the container, comprising inserting a said bag unit through said opening, applying compressed gas through said port to expand said bag within the container while venting the space between the bag and the container, and thereafter admitting a substance to the  
30 expanded bag through said port.





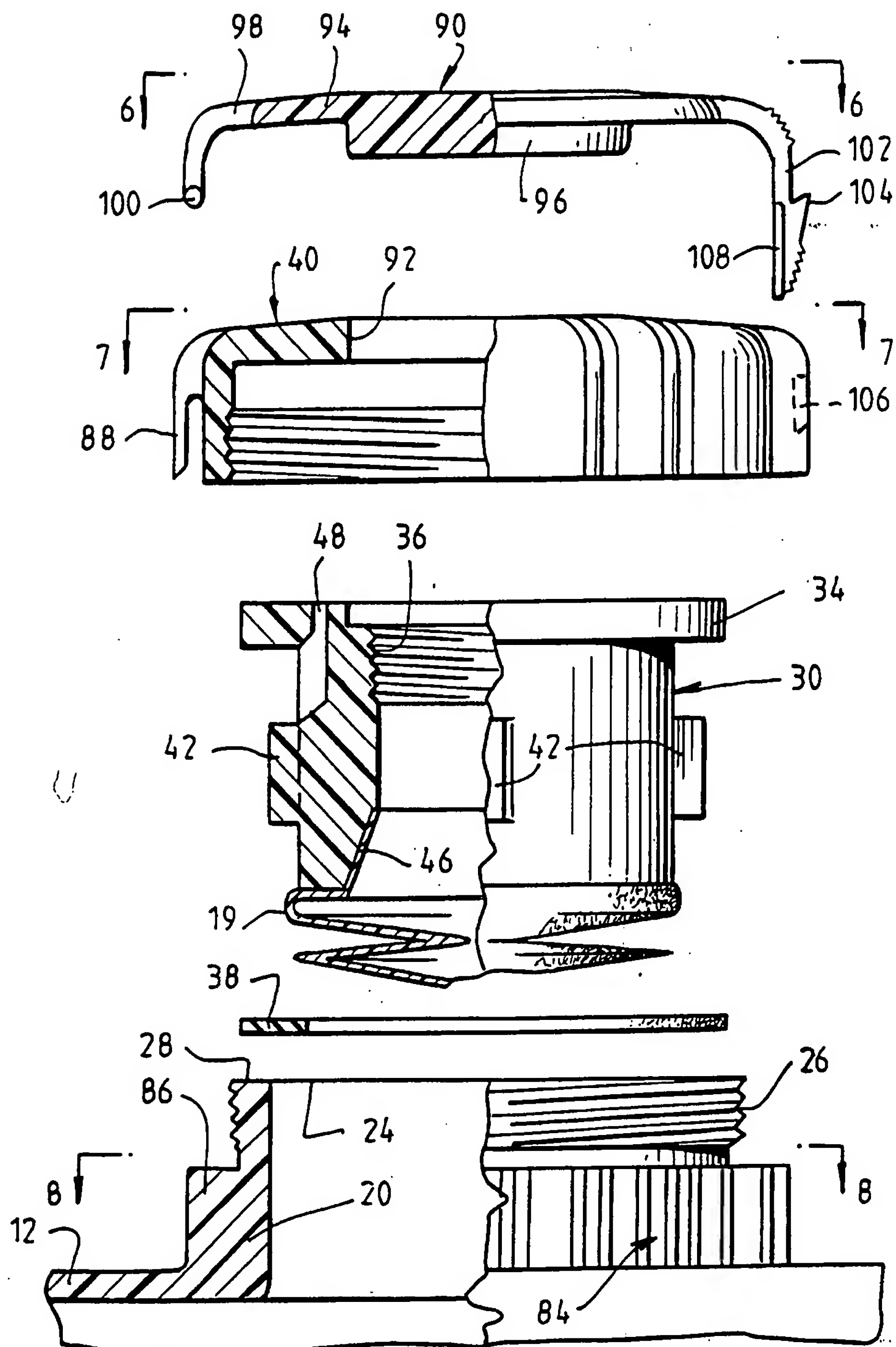
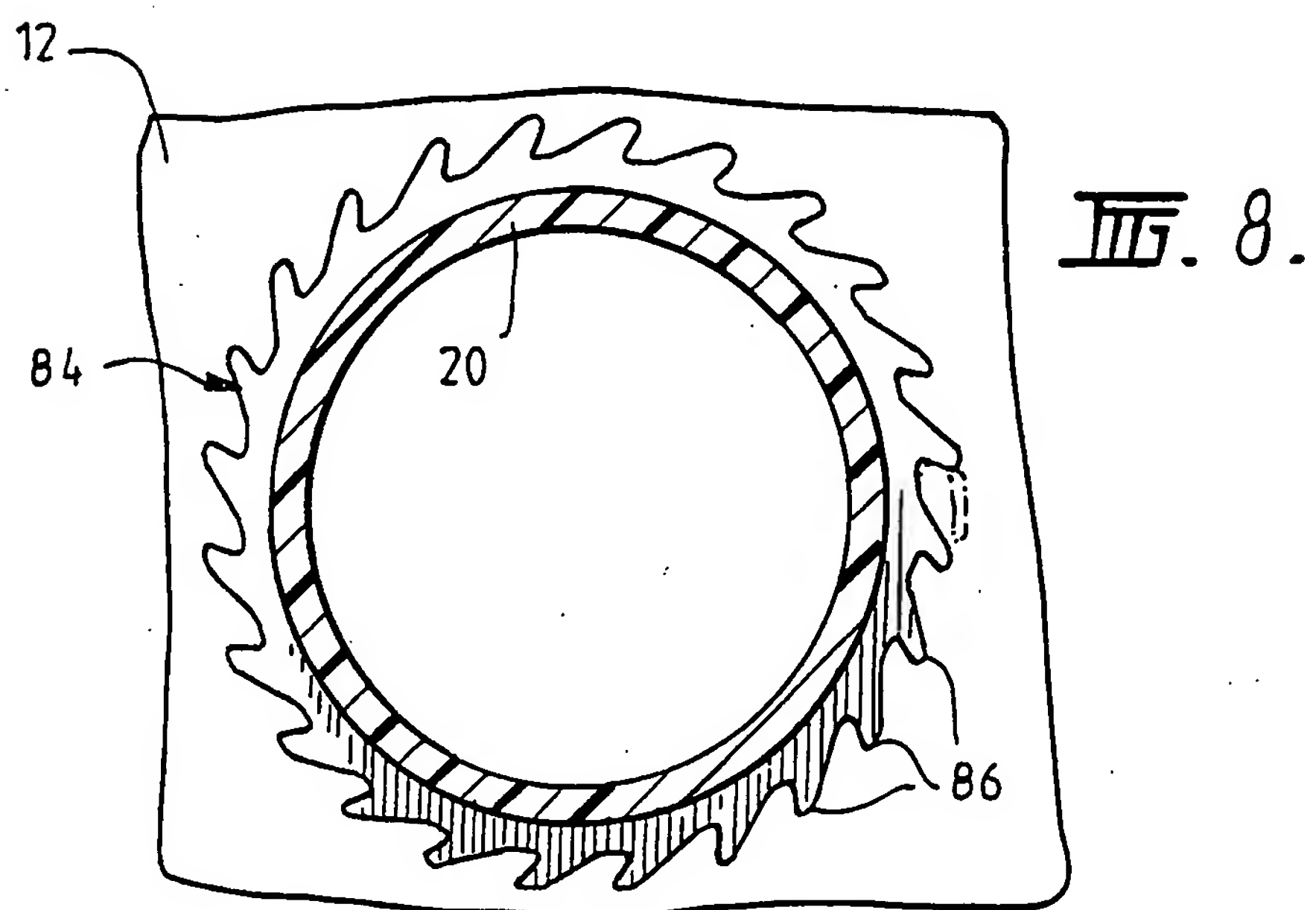
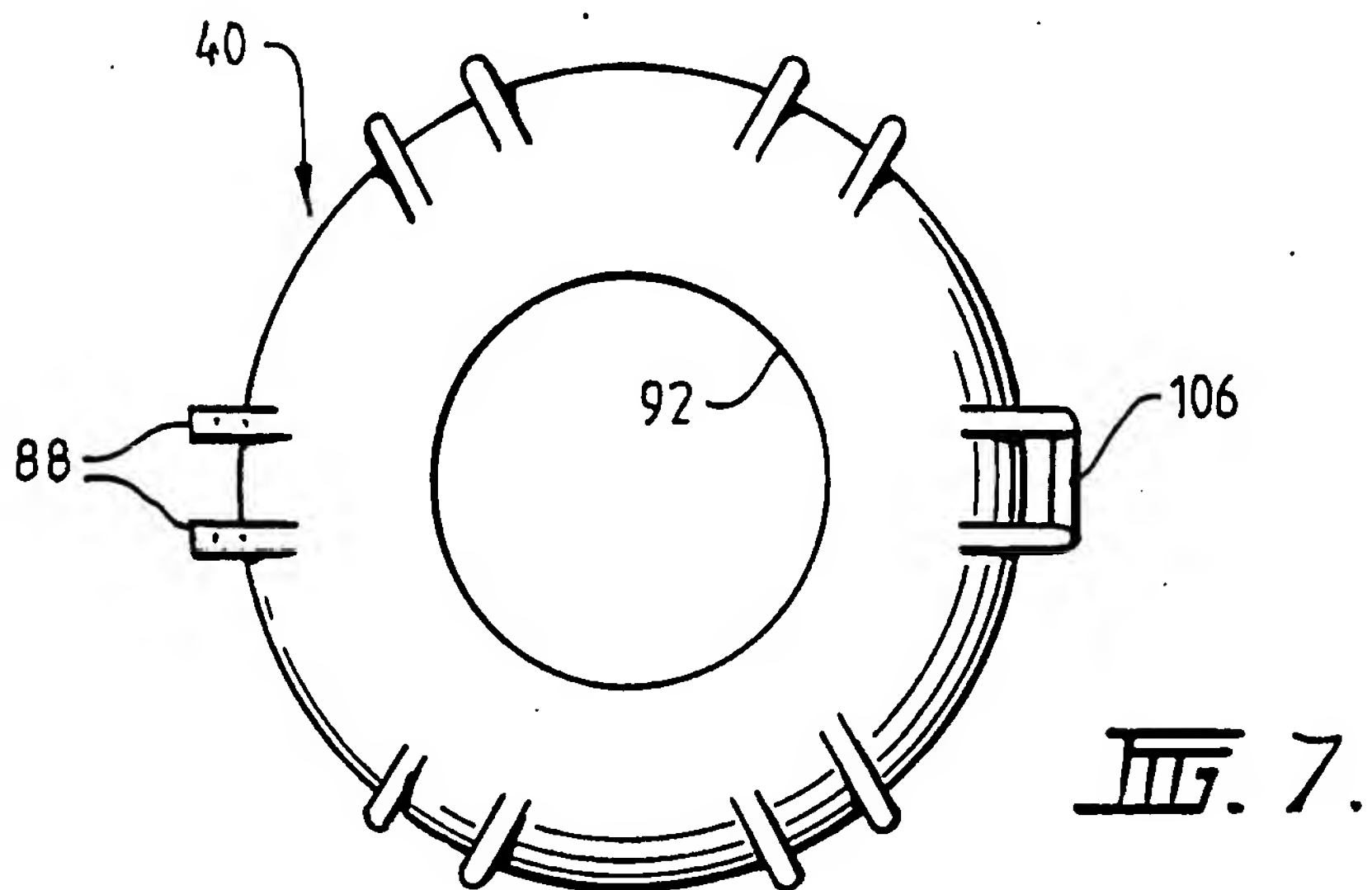
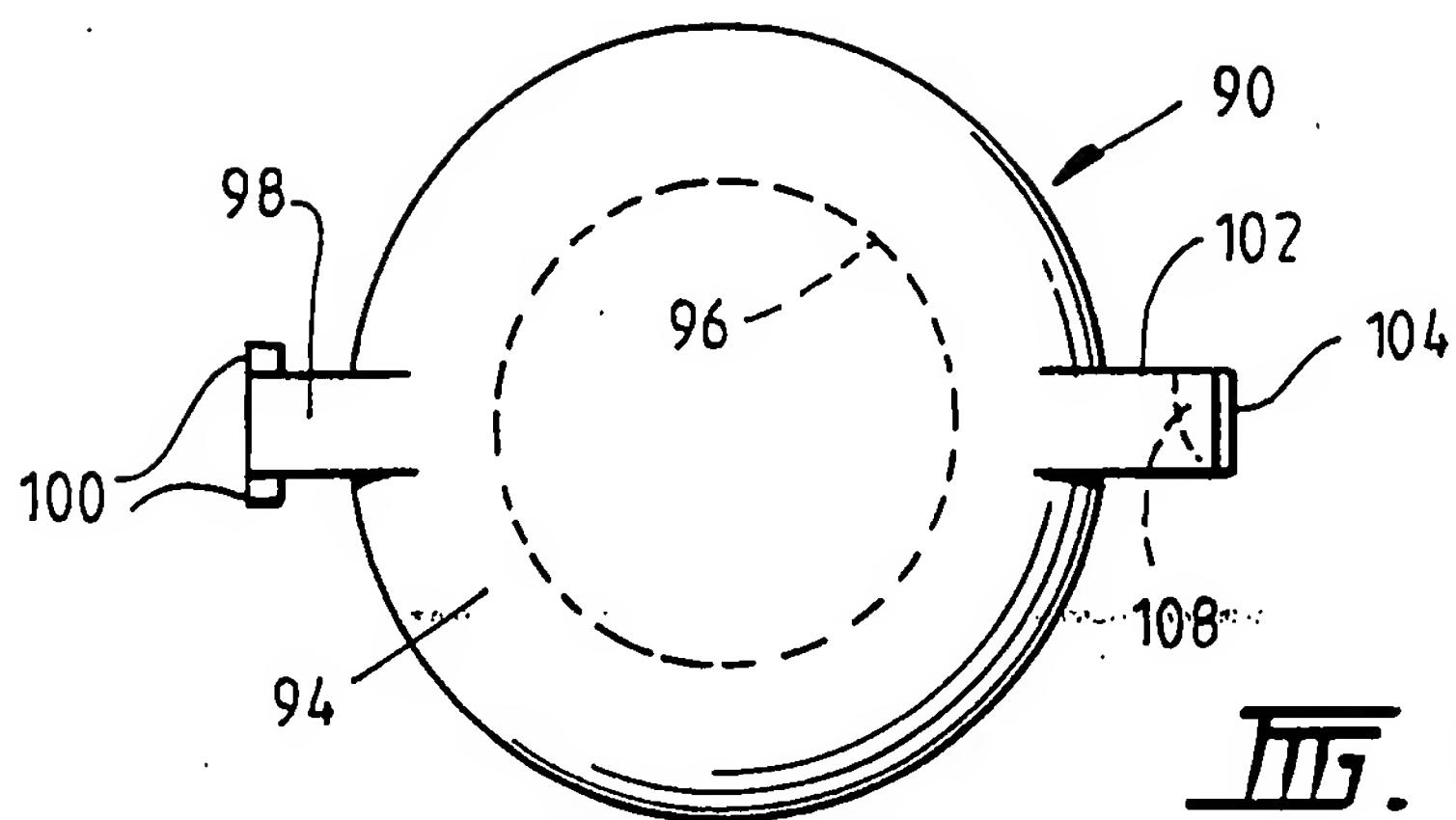


FIG. 5.



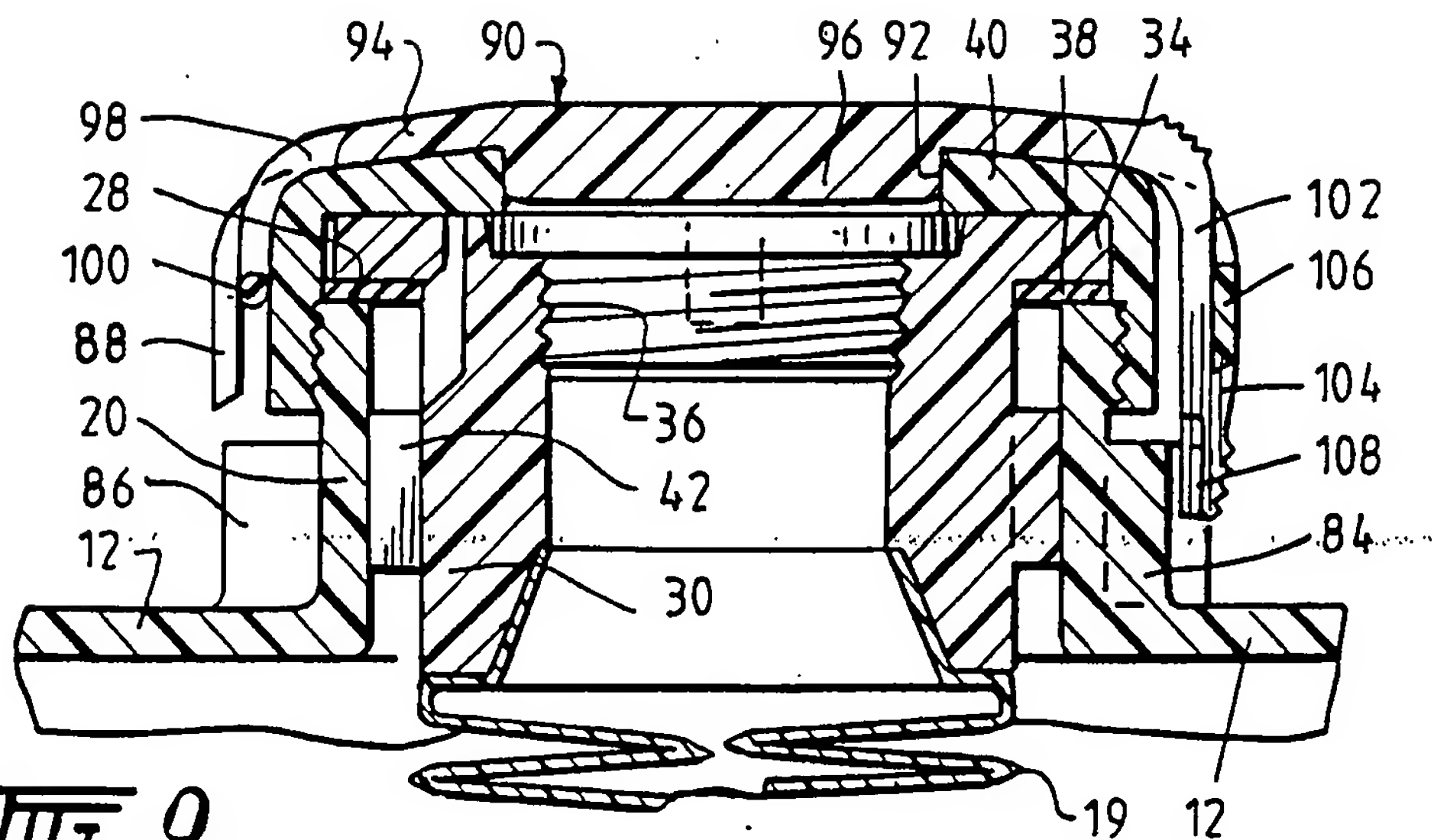


FIG. 9.

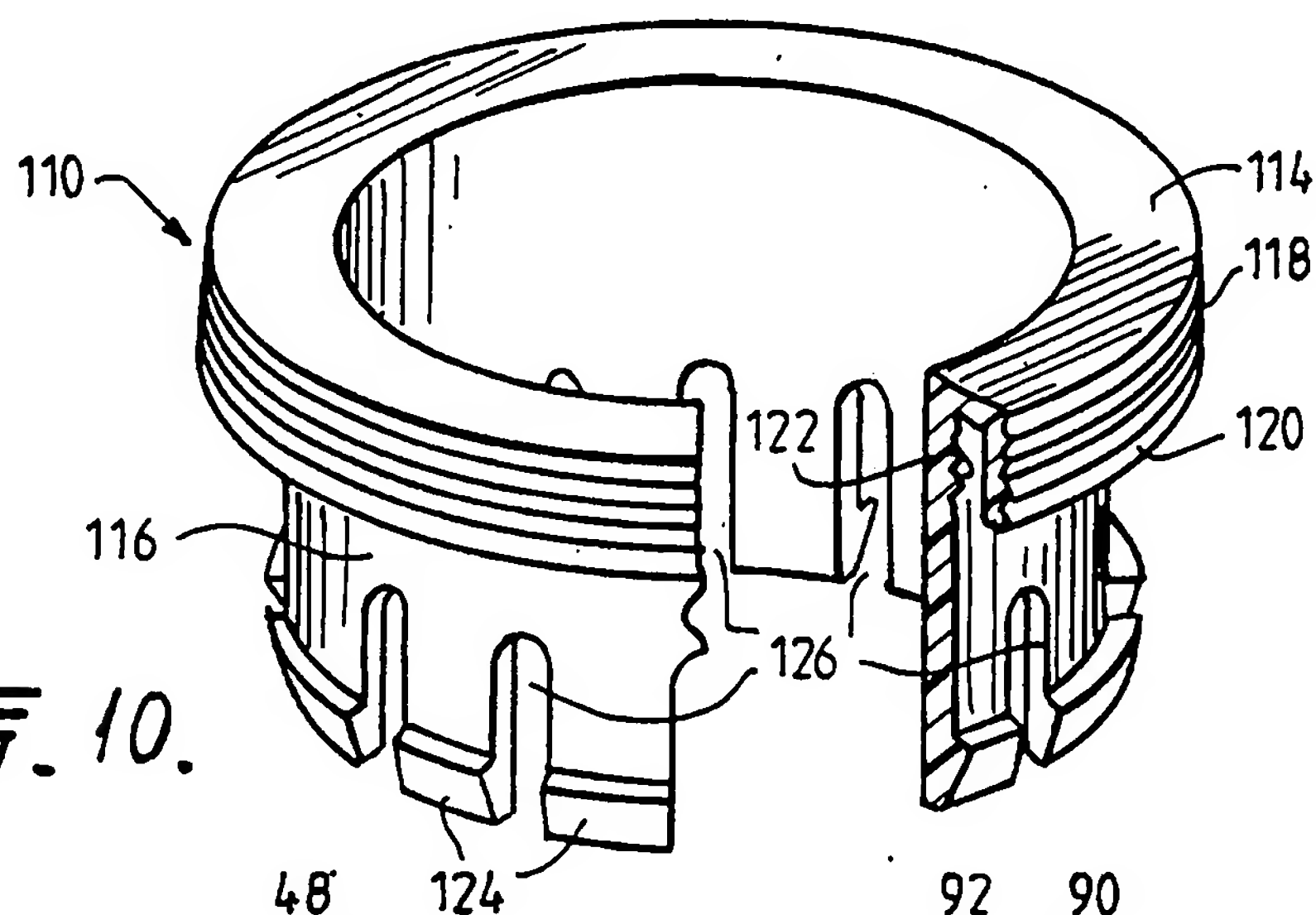


FIG. 10.

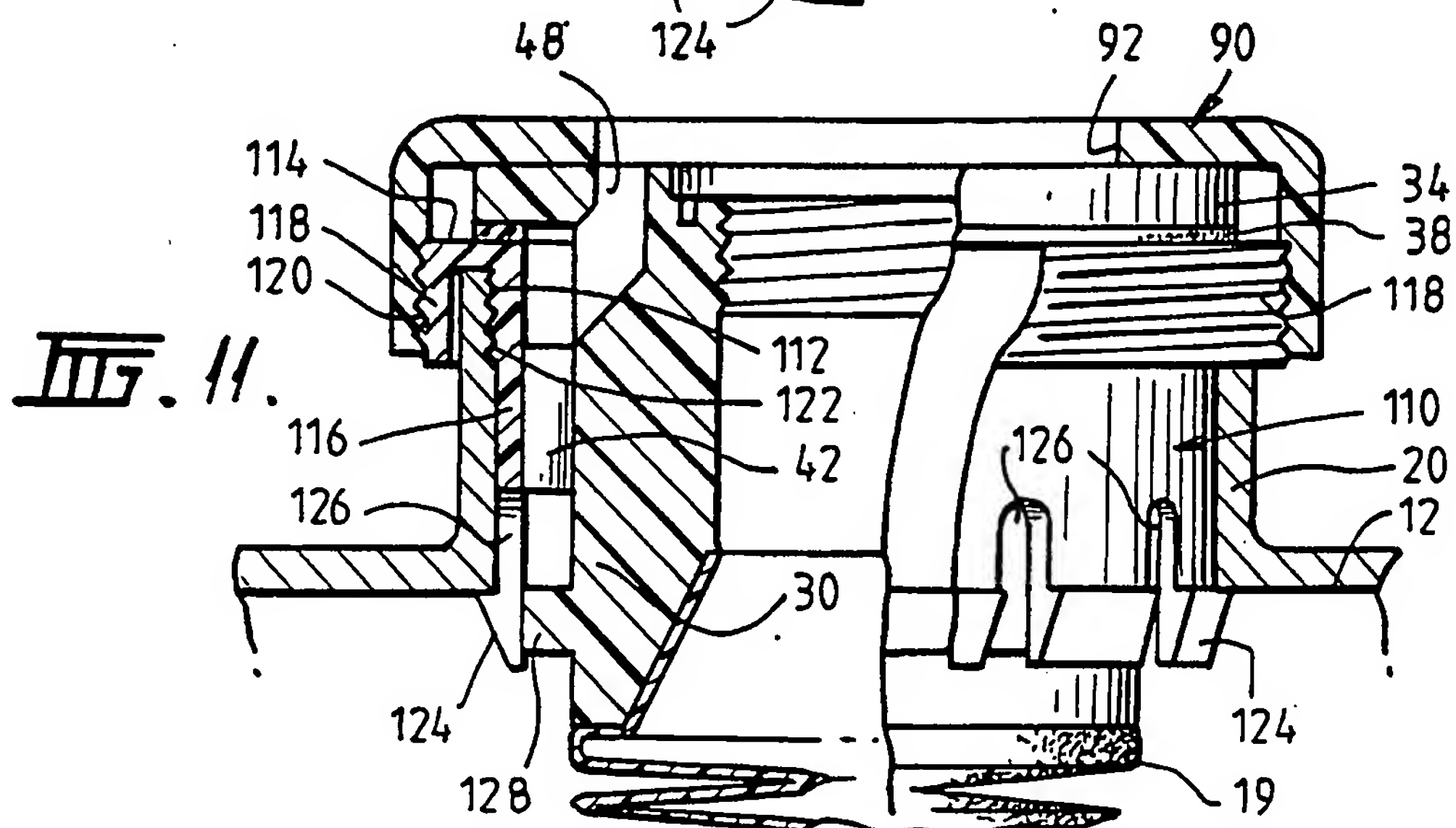
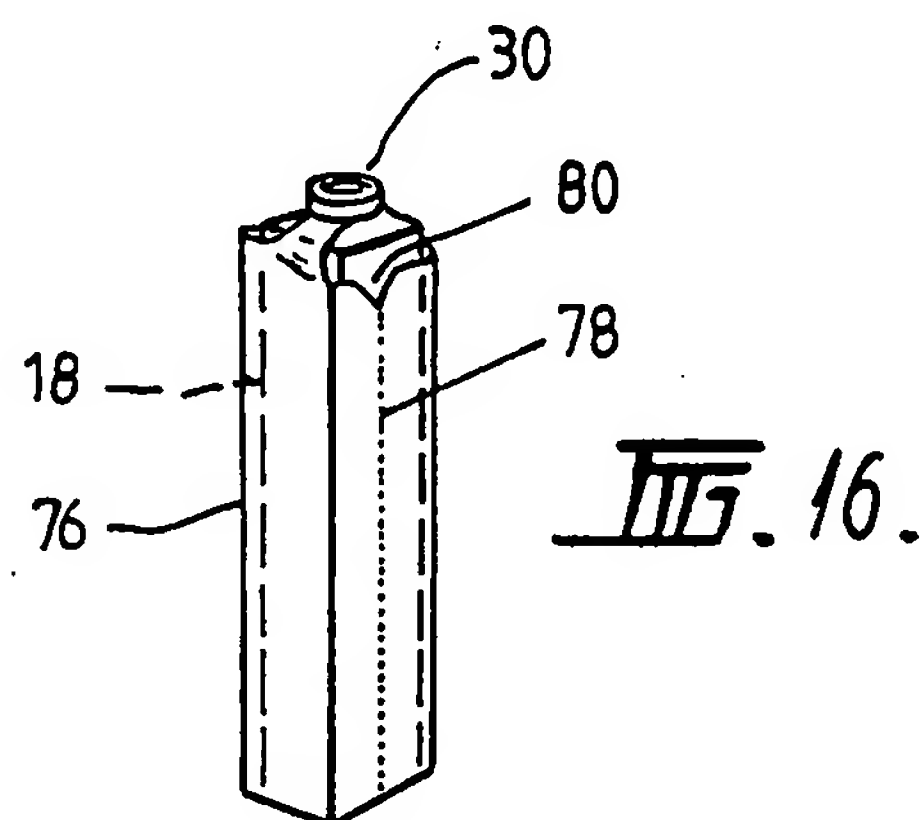
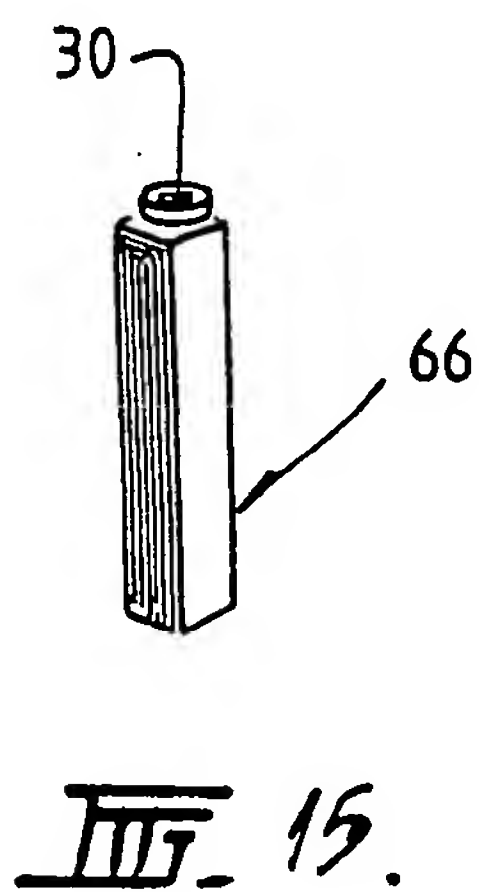
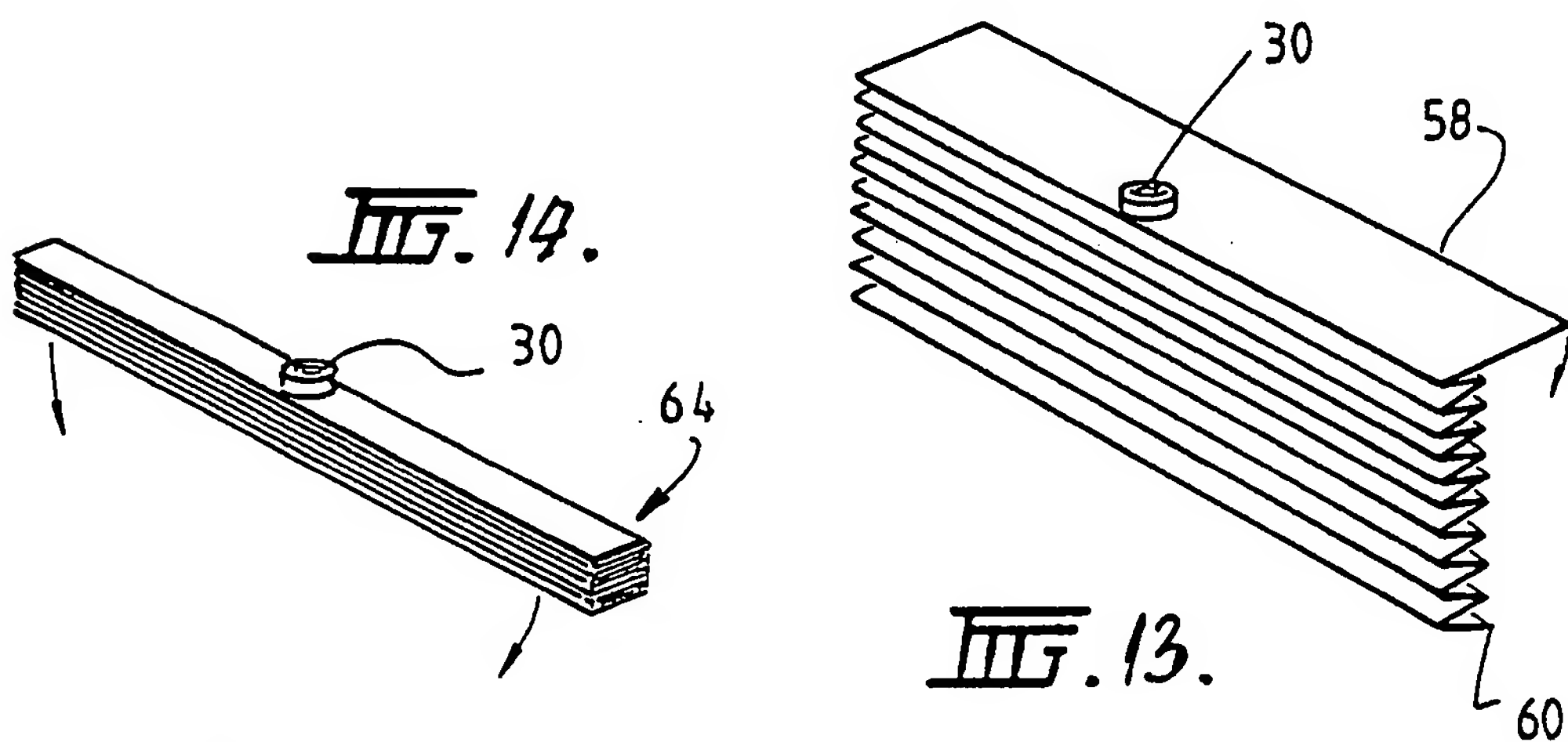
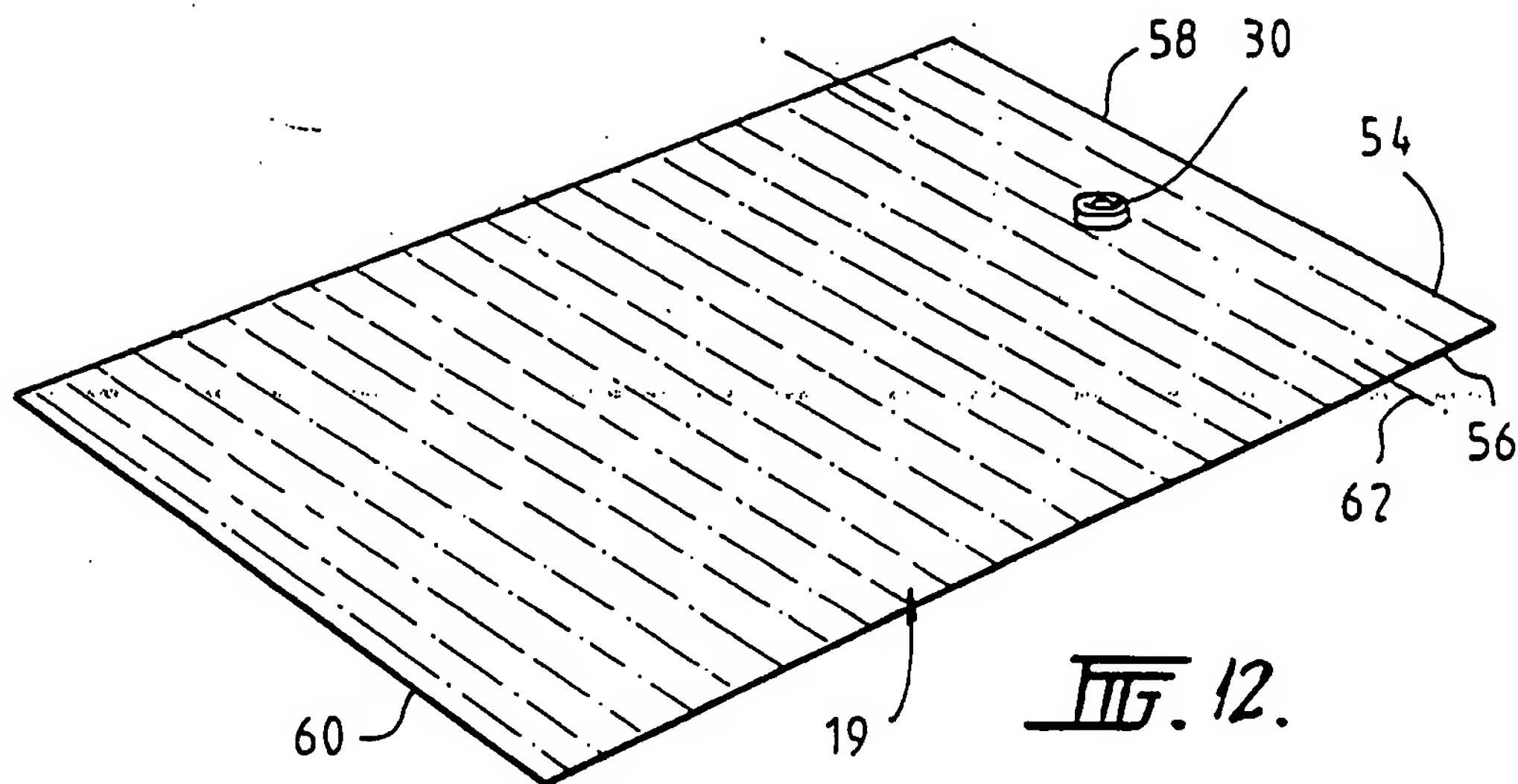
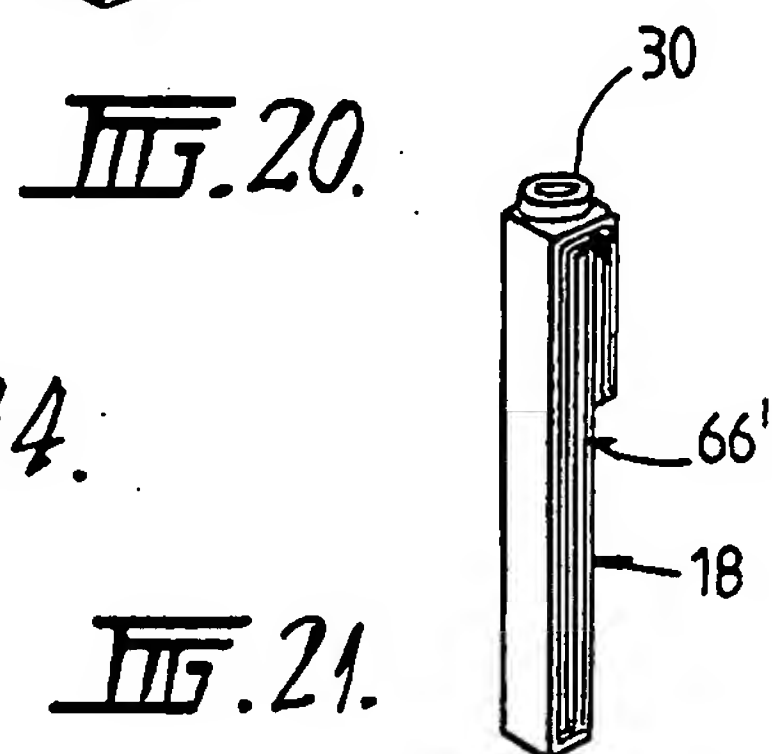
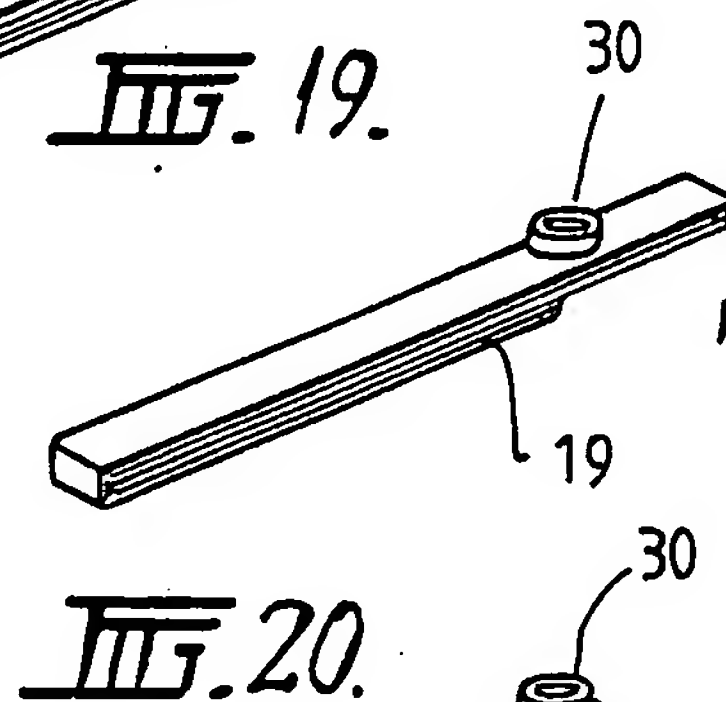
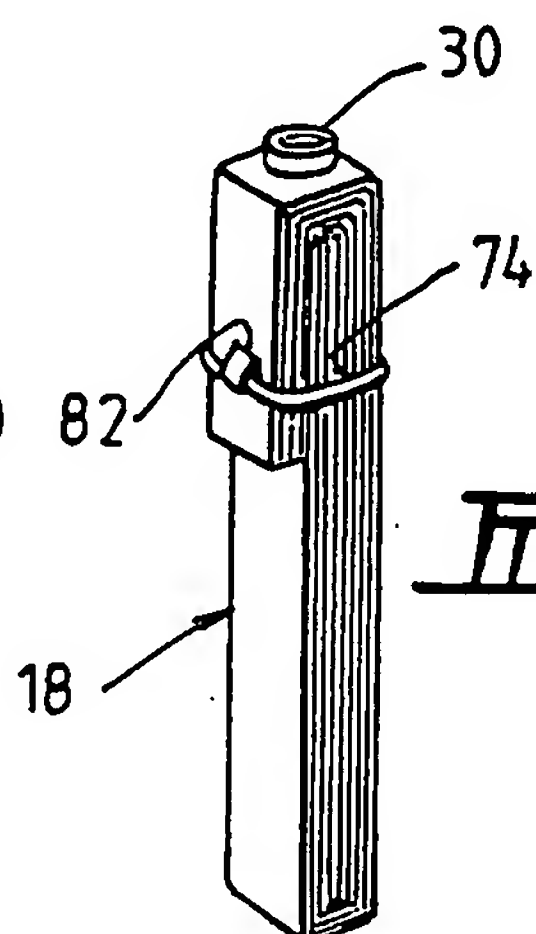
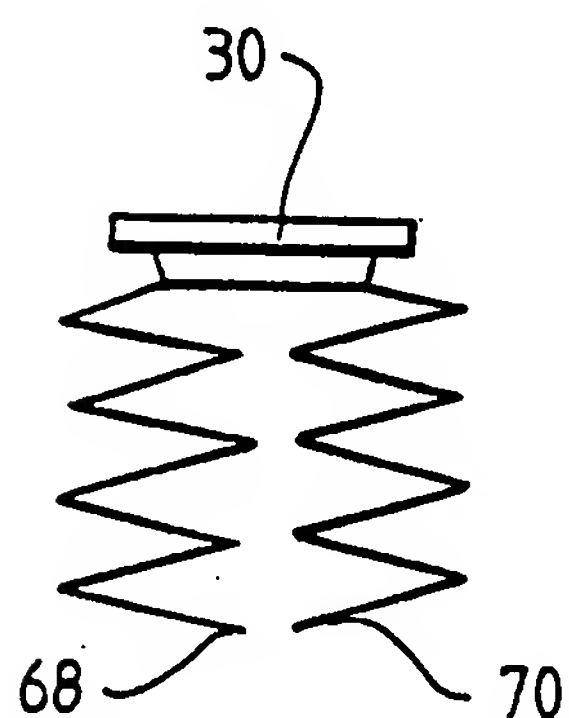
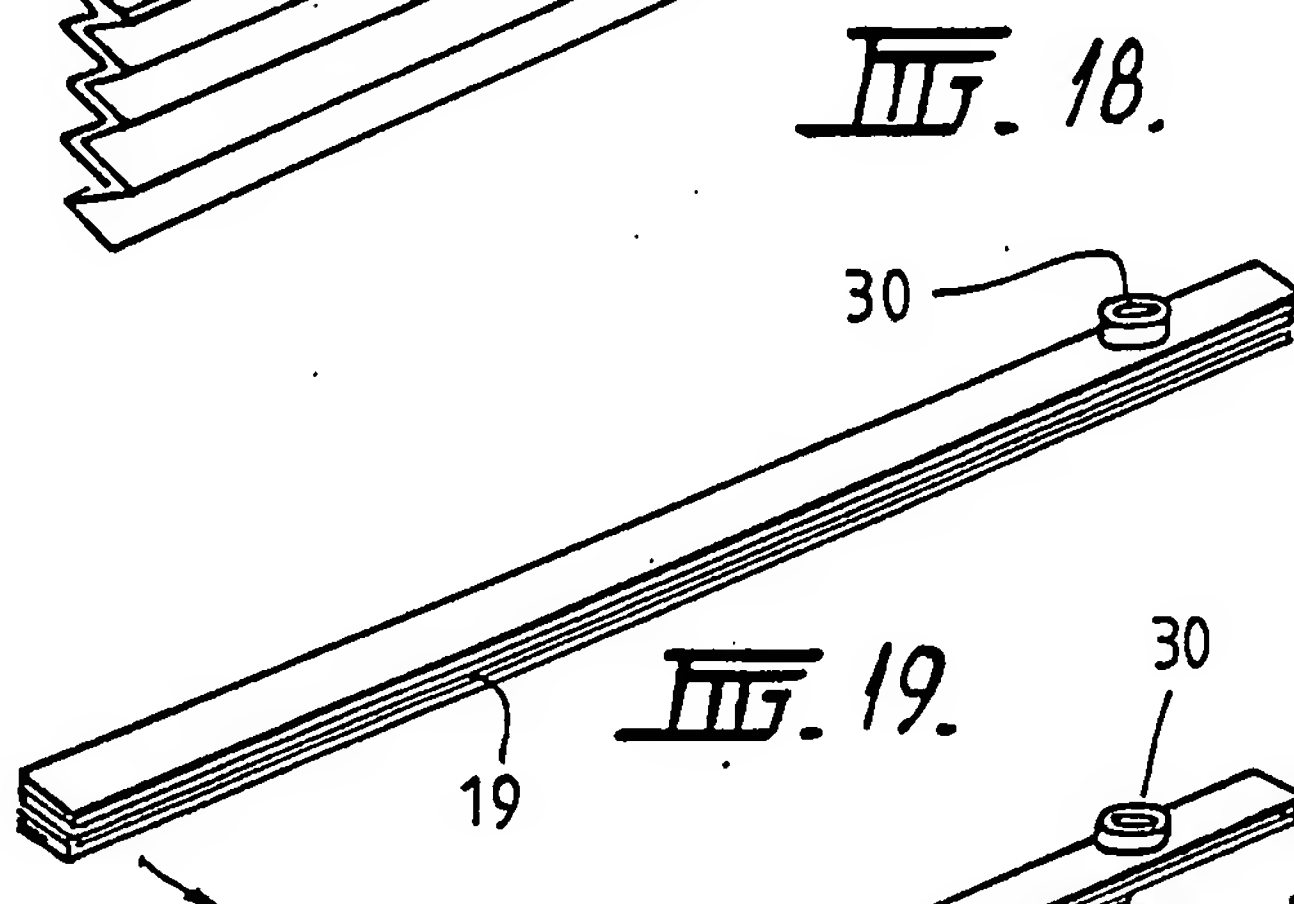
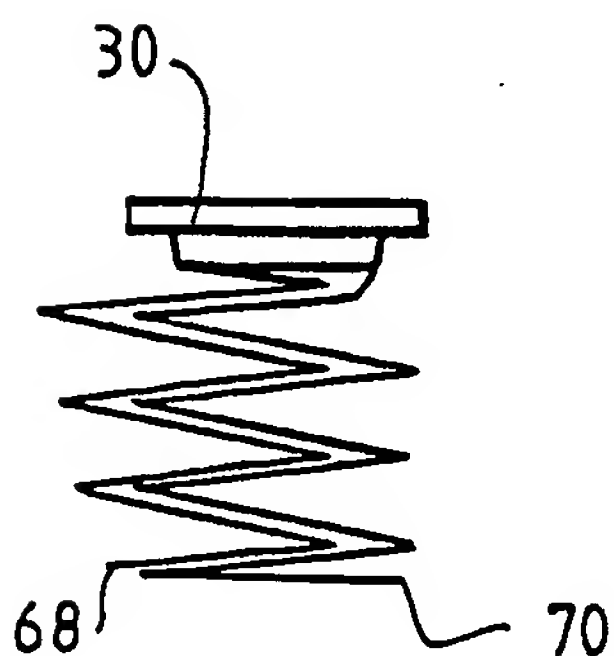
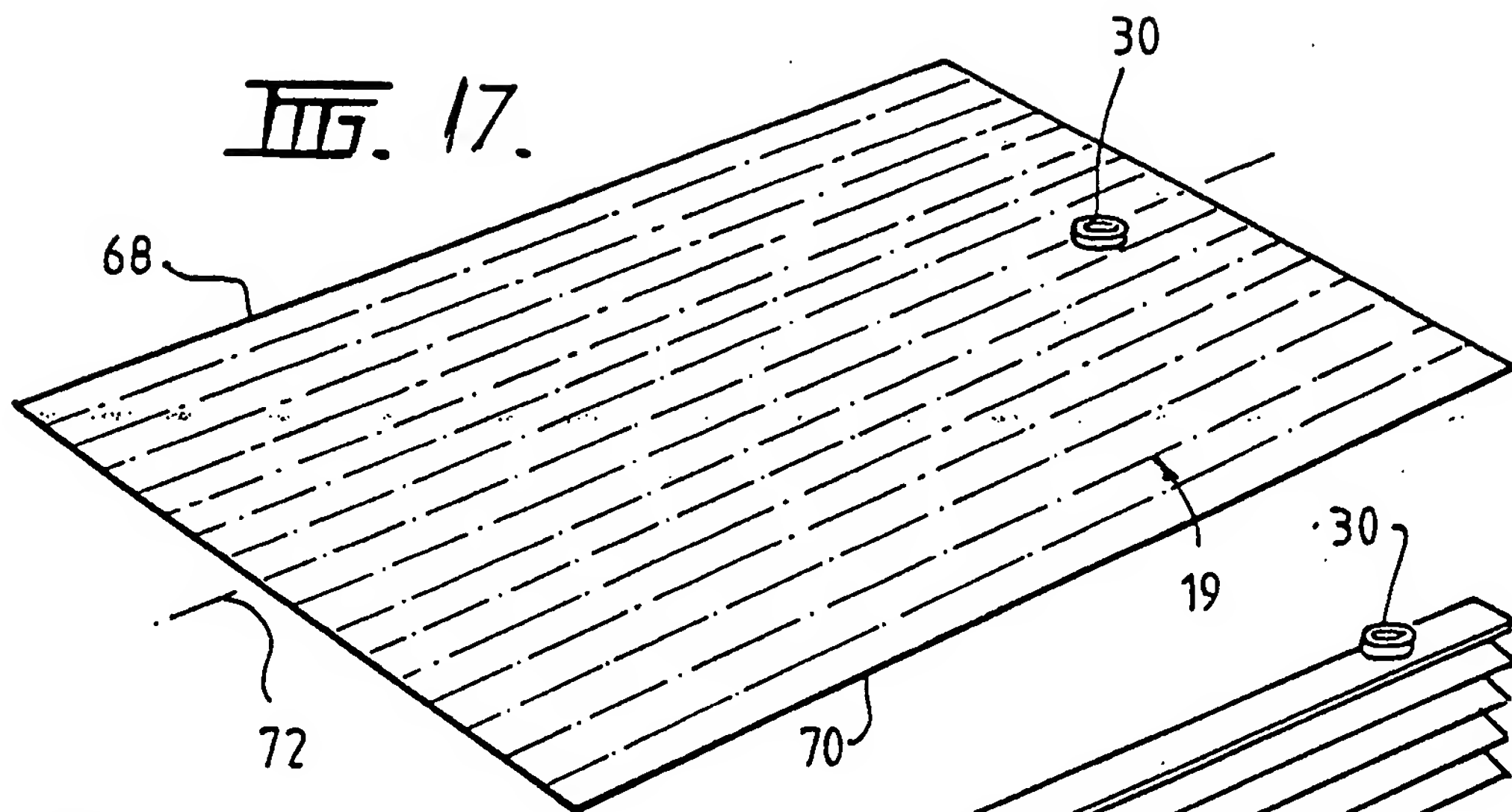


FIG. 11.

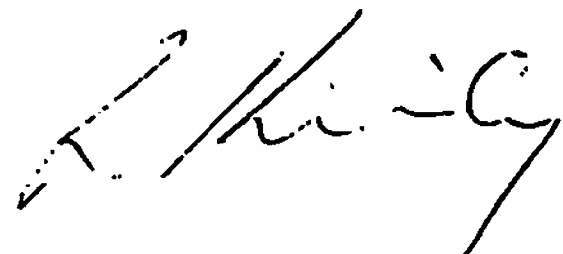




## INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU 94/00068

<b>A. CLASSIFICATION OF SUBJECT MATTER</b> Int. Cl. <sup>5</sup> B65D 77/06, 25/16  According to International Patent Classification (IPC) or to both national classification and IPC				
<b>B. FIELDS SEARCHED</b>  Minimum documentation searched (classification system followed by classification symbols) IPC: B65D 77/06, 25/14, 25/16  Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched AU: IPC as above B65D 39/10, 51/16  Electronic data base consulted during the international search (name of data base, and where practicable, search terms used) NIL				
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>				
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.		
X, Y	AU, B, 24197/67 (426638) (CLARENCE B. COLEMAN) 9 January 1969 (09.01.69) Pages 6, 7, 8 and Figures 6 to 11	1-7, 13, 14, 23		
P, X, Y	AU, A, 35762/93 (KONINKLIJKE EMBALLAGE INDUSTRIE VAN LEER B.V.) 5 August 1993 (05.08.93) Figures 1 to 4	1, 8, 13, 14, 17, 18		
X, Y	AU, A, 80879/91 (NEVRADAKIS) 26 December 1991 (26.12.91) Figures - Pages 10, 11, 13, 14 and 27	1, 8-12, 15, 17, 18, 19		
<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;"> <input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C.         </div> <div style="text-align: center;"> <input checked="" type="checkbox"/> See patent family annex.         </div> </div>				
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;">           * Special categories of cited documents :            "A" document defining the general state of the art which is not considered to be of particular relevance            "E" earlier document but published on or after the international filing date            "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)            "O" document referring to an oral disclosure, use, exhibition or other means            "P" document published prior to the international filing date but later than the priority date claimed         </td> <td style="width: 50%; vertical-align: top;">           "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention            "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone            "Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art            "&amp;" document member of the same patent family         </td> </tr> </table>			* Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family
* Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family			
Date of the actual completion of the international search 23 May 1994 (23.05.94)	Date of mailing of the international search report 6 June 1994 (06.06.94)			
Name and mailing address of the ISA/AU  AUSTRALIAN INDUSTRIAL PROPERTY ORGANISATION PO BOX 200 WODEN ACT 2606 AUSTRALIA  Facsimile No. (06) 2853929	Authorized officer  <div style="text-align: center; font-size: 1.5em;">  </div> <b>R. KIRBY</b>  Telephone No. (06) 2832369			

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate of the relevant passages	Relevant to Claim No.
X,Y	FR,A,2371355 (GRAF O GMBH) 21 July 1978 (21.07.78) Figures 1 and 3	1,8,14,15,19
X,Y	AU,A,25496/88 (LAMB) 20 April 1989 (20.04.89) Figures 1 to 4	1,8-11
X,Y	AU,B,27469/57 (221680) (JOHN KEITH MALCOMSON AND PETER LINDLEY WADDELL) 7 November 1957 (07.11.57) Whole document	1,2,3
X,Y	FR,A,1295469 (LEFLAIVE) 31 October 1962 (31.10.62) Figures 1, 2 and 3	1-7
Y	US,A,4560085 (VOM HOFE et al) 24 December 1985 (24.12.85) Figures 3, 4, 5 and 9	16

**Box I** Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)

This international search report has not established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claim Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box II** Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

See Supplementary Sheet.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.: 1-19 and 23

**Remark on Protest**

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

## Supplementary Sheet - Continuation of Box II

The international application does not comply with the requirements of unity of invention because it does not relate to one invention or to a group of inventions so linked as to form a single general inventive concept. In coming to this conclusion the International Searching Authority has found:

Claims 1-19 and 23 are characterised by a bag assembly which is capable of being inserted through an opening of a substantially rigid container. Hence, the bag assembly is considered to comprise the first "special technical feature".

Claims 20-22 are directed to a thread converter which is characterised by the converter having inner and outer cylindrical sleeves that are joined together at one end by a circumferential flange. To act as a thread converter, both the inner and outer sleeves have a thread on their outer cylindrical surfaces. Thus, it is considered that the thread converter comprises a second "special technical feature".

Since the abovementioned groups of claims do not share either of the technical features identified, a "technical relationship" between the inventions, as defined in PCR rule 13.2 does not exist. Accordingly, the international application does not relate to one invention or to a single inventive concept.

Information on patent family members

PCT/AU 94/00068

Patent Document Cited in Search Report		Patent Family Member	
AU 35762/93	CN 1076662	NL 9200148	WO 93/14984
AU 80879/91	GR 1000605	WO 91/19651	
FR 2371355	DE 7636440	ES 225473	IT 1123694
US 4560085	AT 8765	DE 3045710	DE 3165265
	EP 53715	ES 507680	ES 261840
	JP 3023433	US 4430068	ZA 8108452
AU 25496/88	WO 89/03353		

END OF ANNEX